Beiersdorf 454.3-HCL
100718-53
6713-Dr. Wl-ar

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS	:	EITRICH et al.
SERIAL NO.	:	**08/930,235**
FILED	:	23 February 1998
FOR	:	COSMETIC OR PHARMACEUTICAL MICROEMULSIONS
ART UNIT	:	**1712**
EXAMINER	:	**Richard Lovering or Daniel Metzmaier**

DECLARATION UNDER 37 C.F.R 1.132

I, Yuzhuo Li, Ph. D. of Potsdam, New York, a citizen of the United States, hereby declare:

(1) that I have been a full tenured professor of Chemistry since July 2002 and have been a professor since 1990 at Clarkson University (Potsdam, NY);

(2) that I am a faculty member of Clarkson University's Center for Advanced Materials Processing;

(3) that I received the degree of Doctor of Philosophy (Ph.D.) in Organic Chemistry at the University of Illinois (Urbana-Champaign) in 1988;

(4) that my current research projects include (a) Preparation and Characterization of Liposomes; and (b) Emulsion and Microemulsion Polymerization; (c) Applications of supramolecular structures

(5) that I was a co-instructor of the annual American Chemical Society Short Course "Surfactants, Micelles, Liposomes and Liquid Crystals in Emulsions and Microemulsions" in 2000, 2001, and 2002;

(6) that I am a member of the following professional organizations:
- (a) American Chemical Society, Member, 1986-
- (b) American Institute of Chemical Engineers, Member, 1998-
- (c) Controlled Released Society, Member, 2001-

(d) Materials Research Society, Member, 1999-

(e) New York Academy of Sciences, Member, 1994-

(f) Sigma Xi, The Scientific Research Society, Member, 1991-

(7) that I am the co-author of 82 publications and have given more than 80 lectures in the area of organic chemistry from 1984-present;

(8) that I have served as an invited lecturer on various topics of organic chemistry on more than 120 separate occasions at various academic institutions, professional meeting and private industries since 1987 (private industries include Bristol-Myers Squibb, DuPont Pharmaceuticals, General Electric, Honeywell, Intel, PPG Industries, Rohm-Haas and Seagate Technology);

I am ***not an inventor*** nor do I own any interest in the invention represented by SN: 08/930,235. I have reviewed the specification and claims of the '235 application and have reviewed the Examiner's office action of 24 December 2003 (all reference to the Examiner's writings below refer to this office action). The basis for the rejection of the applicants' claims by the Examiner appears to be his reliance on the teachings of Allard et al. (U.S. Patent 5,616,331 - hereafter referred to as "Allard") whereby it is asserted that an invention directed toward an ***ultrafine emulsion*** could be optimized in order to arrive at the ***microemulsion*** because the ultrafine emulsion displays some of the properties of a microemulsion. Notwithstanding that Allard does not teach which element is to be optimized to convert the ultrafine emulsion into a microemulsion, even if a specific element were to be identified, the Examiner's rationale is incorrect for the following reasons.

1. The Examiner wrote on page 2, paragraph 3, "Allard et al ... discloses transparent or translucent microemulsions of the oil-in-water type containing an oil phase .. nanopigment TiO2 and an aqueous phase." The Examiner is incorrect in classifying Allard's system as a microemulsion.

   a. First, throughout the patent, Allard never discloses their system to be a microemulsion. This does not appear to be through negligence or omission; it is believed that their choice to use the term "ultrafine emulsion" was a conscious one to signal to those of ordinary skill in the art that their invention was not a microemulsion.

b. Second, a microemulsion system must be in a one-phase region on a phase diagram. It requires ***all chemical components in the system to be in equilibrium***. The physical consequence of such a chemical equilibrium includes but is not limited to properties such as transparency, particle sizes smaller than 100 nm and high dispersion stability. These physical appearances are the reflection of a microemulsion system.

If a system possesses the above described physical appearance, but fails the equilibrium test, the system is not a microemulsion, i.e. not all systems that have transparency particle size smaller than 100 nm, and/or high dispersion stability are microemulsions. Michael Faraday prepared a stable nano gold particle colloid more than 100 years ago (References 1-4). The colloidal system is still perfectly stable today and on display in the London Museum, England. The system was and is not a microemulsion, because the gold atoms in the particle never established equilibrium with its dispersion phase. Faraday's system is only kinetically stable. There is no thermodynamic equilibrium and stability here.

Allard's system is analogous to Faraday's gold colloid because, in Allard's system, the TiO_2 is an insoluble solid that ***will never establish equilibrium with its dispersion phase***.

2. The Examiner further wrote on page 3, lines 3-8 that "It would have been obvious to one of ordinary skilled in the art .... that choice of suitable or optimum concentrations of ingredients is well within the expected skill of a worker in the art."

This is an erroneous assumption as the two systems described by Allard and the applicants have fundamentally different phase behavior and are designed to achieve different objectives; it would take different sets of skills to understand the commonality of the two systems and thereby determine what would constitute a "suitable" ingredient. In addition, one system cannot be obtained by simple optimization of concentrations of ingredients from the other system.

3. The Examiner further wrote on page 3, paragraph 5 that "[a] key property of microemulsion is thermodynamic stability. Allard et al discloses compositions as ... perfectly homogeneous and stable over time." While the Examiner properly acknowledged the nature of a microemulsion to

be thermodynamically stable, the Examiner failed to understand the difference in kinetic stability and thermodynamic stability. A system which appears to be stable over time may not be stable thermodynamically. In order to be thermodynamically stable, a system must have no memory effect in terms of temperature treatment. In this regard, there is no evidence that Allard's systems as prepared will return to the same physical and chemical state after repeated temperature treatment (raising and lowering the temperature of the system).

4. The Examiner wrote on page 4, paragraph 7 that "Allard et al clearly teaches translucent compositions in Table 1, which applicants claims set forth. Furthermore the skilled artisan employing less oily phase as clearly contemplated in the Allard et al reference would have generally expected increased stability based on the increased emulsifier to oily ratio." The Examiner's speculation is based on a misinterpretation of Allard's teaching and a misunderstanding of the basic requirement for stability in systems like Allard's.

a. First, Allard's systems are not thermodynamically stable microemulsions. The dispersing phase in Allard's system (removing TiO_2 from the composition) was never intended to be a thermodynamically stable microemulsion. If the dispersing phase was already thermodynamically stable, adding solid nano particles, which are designed to be adsorbed onto the interface between the oily and aqueous components, would cause the system will become less stable.

b. Second, the ultrafine emulsion system described in Allard's patent is a classic case in which surface active particles serve as a stabilizing agent that keeps the overall surface energy of an emulsion low and stabilizes the same (References 5-8). It is well known that there is a preferred size ratio of the stabilizing particles over the size of the oily phase to be stabilized.

A rule of thumb is that the size of the stabilizing solid particles should be one tenth or smaller of the size of the emulsion droplet. The Examiner's notion that a smaller oil droplet size in Allard's dispersing media could translate to a more stable final system is erroneous. It was not Allard's intention to create a microemulsion as their dispersing phase because it is well known to those skilled in the art that such a microemulsion

system will not be able to accommodate the incoming solid particles at the interface effectively.

5. The Examiner also wrote on page 4, paragraph 7 that "...the evidence showing at least translucent, perfectly homogeneous and stable over time emulsions taught in Allard et al...". However, Allard's systems are multiphase (water, oil, and solid) in nature, they should be described as being a heterogeneous system, although they appear to be homogeneous by naked eye.

6. The Examiner also wrote on pages 4-5, paragraph 8 that "Allard et al clearly teaches the failings of the prior art... smaller particle size emulsions, e.g., ultra-fine or microemulsion would be expected to those of ordinary skill in the art,". Again, the Examiner failed to recognize that the difference between a microemulsion system described in the present application and the ultrafine emulsion system described in Allard's patent is not merely restricted to differences in particle size.

7. In addition, I have examined the description of the invention in the specification of the present application. As they studied the phase diagram of the chemical components and formulated their systems to be in the one-phase region on the phase diagram, I believe that the present application describes a true microemulsion system. In addition, according to my knowledge about the chemical properties of the components used in the present application's formulations, I believe that it is perfectly reasonable to expect formation of a microemulsion system with the chemical compositions presented in the patent application. Furthermore, a microemulsion system is desirable for the applications described in the present application.

References Cited

1. M. Faraday, Experimental relations of gold (and other metals) to light, Phil. Trans. Roy. Soc. London, 1857, 147, 145-181. (Faraday called it "diffused" gold. By "diffused" he meant a suspension of particles rather than a molecular solution.).
2. R. Zsigmondy, P.A. Thelssen, Das Kolloide Gold; Akademische: Leipzig, 1925.
3. R.H. Doremus, Optical properties of small gold particles, J. Chem. Phys., 1964, 40, 2389-2396.
4. D.A. Weitz, M. Oliveria, Fractal structures formed by kinetic aggregation of aqueous gold colloids. Phys. Rev. Lett. 1984, 52, 1433-1436.

5. S.U. Pickering, J. Chem. Soc., 1907, 91, 2001.
6. V.B. Mennon, D.T. Wasan, A review of the factors affecting the stability of solids-stabilized emulsions, Separation Sci. and Techn., 1988, 23, 2131-2142.
7. B.P. Binks, S.O. Lumsdon, Stability of oil-in-water emulsions stabilized by silica particles, Phys. Chem. Chem. Phys. 1999, 1, 3007-3016.
8. S. Ross, I. Morrison, Colloidal Systems and Interfaces; John Wiley & Sons: New York, 1988, p. 271.

The undersigned declarant hereby declares that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 20, 2004
Date

Yuzhuo Li, Ph.D
Professor of Chemistry
Clarkson University